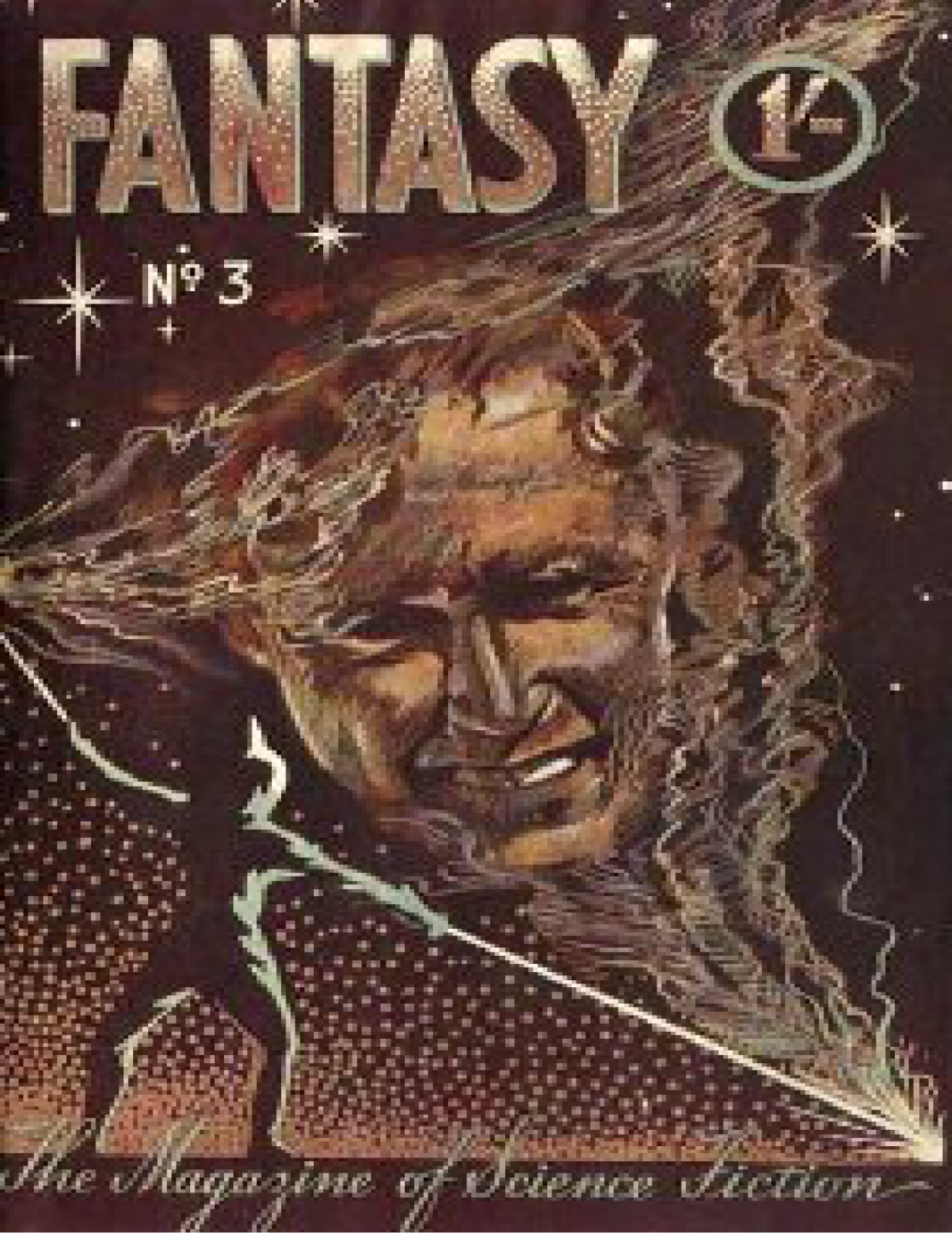
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- The Fires Within
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# The Fires Within
# by Arthur C. Clarke

"This," said Karn smugly, "will interest you. Just take a look at it!"

He pushed across the file he had been reading, and for the *nth* time I decided to ask for his transfer, or failing that, my own.

"What's it about?" I said wearily.

"It's a long report from a Dr Matthews to the Minister of Science." He waved it in front of me. "Just read it!"

Without much enthusiasm, I began to go through the file. A few minutes later I looked up and admitted grudgingly: "Maybe you're right—this time." I didn't speak again until I'd finished…

My dear Minister [the letter began]. As you requested, here is my special report on Professor Hancock's experiments, which have had such unexpected and extraordinary results. I have not had time to cast it into a more orthodox form, but am sending you the dictation just as it stands.

Since you have many matters engaging your attention, perhaps I should briefly summarize our dealings with Professor Hancock. Until 1955, the Professor held the Kelvin which he was granted indefinite leave of absence to carry out Chair of Electrical Engineering at Brendon University, from which he was granted indefinite leave of absence to carry out his researches. In these he was joined by the late Dr Clayton, sometime Chief Geologist to the Ministry of Fuel and Power. Their joint research was financed by grants from the Paul Fund and the Royal Society.

The Professor hoped to develop sonar as a means of precise geological surveying. Sonar, as you will know, is the acoustic equivalent of radar, and although less familiar is older by some millions of years, since bats use it very effectively to detect insects and obstacles at night. Professor Hancock intended to send high-powered supersonic pulses into the ground and to build up from the returning echoes an image of what lay beneath. The picture would be displayed on a cathode-ray tube and the whole system would be exactly analogous to the type of radar used in aircraft to show the ground through cloud.

In 1957 the two scientists had achieved partial success but had exhausted their funds. Early in 1958 they applied directly to the government for a block grant. Dr Clayton pointed out the immense value of a device which would enable us to take a kind of X-ray photo of the Earth's crust, and the Minister of Fuel gave it his approval

before passing on the application to us. At that time the report of the Bernal Committee had just been published and we were very anxious that deserving cases should be dealt with quickly to avoid further criticisms. I went to see the Professor at once and submitted a favourable report; the first payment of our grant (5/543A/68) was made a few days later. From that time I have been continually in touch with the research and have assisted to some extent with technical advice.

The equipment used in the experiments is complex, but its principles are simple. Very short but extremely powerful pulses of supersonic waves are generated by a special transmitter which revolves continuously in a pool of a heavy organic liquid. The beam produced passes into the ground and "scans" like a radar beam searching for echoes. By a very ingenious time-delay circuit which I will resist the temptation to describe, echoes from any depth can be selected and so pictures of the strata under investigation can be built up on a cathode-ray screen in the normal way.

When I first met Professor Hancock his apparatus was rather primitive, but he was able to show me the distribution of rock down to a depth of several hundred feet and we could see quite clearly a part of the Bakerloo Line which passed very near his laboratory. Much of the Professor's success was due to the great intensity of his supersonic bursts; almost from the beginning he was able to generate peak powers of several hundred kilowatts, nearly all of which was radiated into the ground. It was unsafe to remain near the transmitter, and I noticed that the soil became quite warm around it. I was rather surprised to see large numbers of birds in the vicinity, but soon discovered that they were attracted by the hundreds of dead worms lying on the ground.

At the time of Dr Clayton's death in 1960, the equipment was working at a power level of over a megawatt and quite good pictures of strata a mile down could be obtained. Dr Clayton had correlated the results with known geographical surveys, and had proved beyond doubt the value of the information obtained.

Dr Clayton's death in a motor accident was a great tragedy. He had always exerted a stabilizing influence on the Professor, who had never been much interested in the practical applications of his work. Soon afterwards I noticed a distinct change in the Professor's outlook, and a few months later he confided his new ambitions to me. I had been trying to persuade him to publish his results (he had already spent over £50,000 and the Public Accounts Committee was being difficult again), but he asked for a little more time. I think I can best explain his attitude by his own words, which I remember very vividly, for they were expressed with peculiar emphasis.

“Have you ever wondered,” he said, “what the Earth really is like inside? We’ve only scratched the surface with our mines and wells. What lies beneath is as unknown as the other side of the Moon.

“We know that the Earth is unnaturally dense—far denser than the rocks and soil of its crust would indicate. The core may be solid metal, but until now there’s been no way of telling. Even ten miles down the pressure must be thirty tons or more to the square inch and the temperature several hundred degrees. What it’s like at the centre staggers the imagination: the pressure must be thousand of tons to the square inch. It’s strange to think that in two or three years we may have reached the Moon, but when we’ve got to the stars we’ll still be no nearer that inferno four thousand miles beneath our feet.

“I can now get recognizable echoes from two miles down, but I hope to step up the transmitter to ten megawatts in a few months. With that power, I believe the range will be increased to ten miles; and I don’t mean to stop there.”

I was impressed, but at the same time I felt a little sceptical.

“That’s all very well,” I said, “but surely the deeper you go the less there’ll be to see. The pressure will make any cavities impossible, and after a few miles there will simply be a homogeneous mass getting denser and denser.”

“Quite likely,” agreed the Professor. “But I can still learn a lot from the transmission characteristics. Anyway, we’ll see when we get there!”

That was four months ago; and yesterday I saw the result of that research. When I answered his invitation the Professor was clearly excited, but he gave me no hint of what, if anything, he had discovered. He showed me his improved equipment and raised the new receiver from its bath. The sensitivity of the pickups had been greatly improved, and this alone had effectively doubled the range, altogether apart from the increased transmitter power. It was strange to watch the steel framework slowly turning and to realize that it was exploring regions, which, in spite of their nearness, man might never reach.

When we entered the hut containing the display equipment, the Professor was strangely silent. He switched on the transmitter, and even though it was a hundred yards away I could feel an uncomfortable tingling. Then the cathode-ray tube lit up and the slowly revolving time-base drew the picture I had seen so often before. Now, however, the definition was much improved owing to the increased power and sensitivity of the equipment. I adjusted the depth control and focused on the Underground, which was clearly visible as a dark lane across the faintly luminous screen. While I was watching, it suddenly seemed to fill with mist and I knew that a train

was going through.

Presently I continued the descent. Although I had watched this picture many times before, it was always uncanny to see great luminous masses floating towards me and to know that they were buried rocks—perhaps the debris from the glaciers of fifty thousand years ago. Dr Clayton had worked out a chart so that we could identify the various strata as they were passed, and presently I saw that I was through the alluvial soil and entering the great clay saucer which traps and holds the city's artesian water. Soon that too was passed, and I was dropping down through the bedrock almost a mile below the surface.

The picture was still clear and bright, though there was little to see, for there were now few changes in the ground structure. The pressure was already rising to a thousand atmospheres; soon it would be impossible for any cavity to remain open, for the rock itself would begin to flow. Mile after mile I sank, but only a pale mist floated on the screen, broken sometimes when echoes were returned from pockets or lodes of denser material. They became fewer and fewer as the depth increased—or else they were now so small that they could no longer be seen.

The scale of the picture was, of course, continually expanding. It was now many miles from side to side, and I felt like an airman looking down upon an unbroken cloud ceiling from an enormous height. For a moment a sense of vertigo seized me as I thought of the abyss into which I was gazing. I do not think that the world will ever seem quite solid to me again.

At a depth of nearly ten miles I stopped and looked at the Professor. There had been no alteration for some time, and I knew that the rock must now be compressed into a featureless, homogeneous mass. I did a quick mental calculation and shuddered as I realized that the pressure must be at least thirty tons to the square inch. The scanner was revolving very slowly now, for the feeble echoes were taking many seconds to struggle back from the depths.

"Well, Professor," I said, "I congratulate you. It's a wonderful achievement. But we seem to have reached the core now. I don't suppose there'll be any change from here to the centre."

He smiled a little wryly. "Go on," he said. "You haven't finished yet."

There was something in his voice that puzzled and alarmed me. I looked at him intently for a moment; his features were just visible in the blue-green glow of the cathode-ray tube.

"How far down can this thing go?" I asked, as the interminable descent started again.

"Fifteen miles," he said shortly. I wondered how he knew, for the

last feature I had seen at all clearly was only eight miles down. But I continued the long fall through the rock, the scanner turning more and more slowly now, until it took almost five minutes to make a complete revolution. Behind me I could hear the Professor breathing heavily, and once the back of my chair gave a crack as his fingers gripped it.

Then, suddenly, very faint markings began to reappear on the screen. I leaned forward eagerly, wondering if this was the first glimpse of the world's iron core. With agonizing slowness the scanner turned through a right angle, then another. And then…

I leaped suddenly out of my chair, cried "My God!" and turned to face the Professor. Only once before in my life had I received such an intellectual shock—fifteen years ago, when I had accidentally turned on the radio and heard the fall of the first atomic bomb. That had been unexpected, but this was inconceivable. For on the screen had appeared a grid of faint lines, crossing and recrossing to form a perfectly symmetrical lattice.

I know that I said nothing for many minutes, for the scanner made a complete revolution while I stood frozen with surprise. Then the Professor spoke in a soft, unnaturally calm voice.

"I wanted you to see it for yourself before I said anything. That picture is now thirty miles in diameter, and those squares are two or three miles on a side. You'll notice that the vertical lines converge and the horizontal ones are bent into arcs. We're looking at part of an enormous structure of concentric rings; the centre must lie many miles to the north, probably in the region of Cambridge. How much further it extends in the other direction we can only guess."

"But what is it, for heaven's sake?"

"Well, it's clearly artificial."

"That's ridiculous! Fifteen miles down!"

The Professor pointed to the screen again. "God knows I've done my best," he said, "but I can't convince myself that Nature could make anything like that."

I had nothing to say, and presently he continued: "I discovered it three days ago, when I was trying to find the maximum range of the equipment. I can go deeper than this, and I rather think that the structure we can see is so dense that it won't transmit my radiations any further.

"I've tried a dozen theories, but in the end I keep returning to one. We know that the pressure down there must be eight or nine thousand atmospheres, and the temperature must be high enough to melt rock. But normal matter is still almost empty space. Suppose that there is life down there—not organic life, of course, but life based on partially condensed matter, matter in which the electron shells are few

or altogether missing. Do you see what I mean? To such creatures, even the rock fifteen miles down would offer no more resistance than water—and we and all our world would be as tenuous as ghosts."

"Then that thing we can see—"

"Is a city, or its equivalent. You've seen its size, so you can judge for yourself the civilization that must have built it. All the world we know—our oceans and continents and mountains—is nothing more than a film of mist surrounding something beyond our comprehension."

Neither of us said anything for a while. I remember feeling a foolish surprise at being one of the first men in the world to learn the appalling truth; for somehow I never doubted that it was the truth. And I wondered how the rest of humanity would react when the revelation came.

Presently I broke into the silence. "If you're right," I said, "why have they—whatever they are—never made contact with us?"

The Professor looked at me rather pityingly. "We think we're good engineers," he said, "but how could we reach *them*? Besides, I'm not at all sure that there haven't been contacts. Think of all the underground creatures and the mythology—trolls and kobolds and the rest. No, it's quite impossible—I take it back. Still, the idea is rather suggestive."

All the while the pattern on the screen had never changed: the dim network still glowed there, challenging our sanity. I tried to imagine streets and buildings and the creatures going among them, creatures who could make their way through the incandescent rock as a fish swims through water. It was fantastic… and then I remembered the incredibly narrow range of temperatures and pressures under which the human race exists. *We*, not they, were the freaks, for almost all the matter in the universe is at temperatures of thousands or even millions of degrees.

"Well," I said lamely, "what do we do now?"

The Professor leaned forward eagerly. "First we must learn a great deal more, and we must keep this an absolute secret until we are sure of the facts. Can you imagine the panic there would be if this information leaked out? Of course, the truth's inevitable sooner or later; but we may be able to break it slowly.

"You'll realize that the geological surveying side of my work is now utterly unimportant. The first thing we have to do is to build a chain of stations to find the extent of the structure. I visualize them at ten-mile intervals towards the north, but I'd like to build the first one somewhere in South London to see how extensive the thing is. The whole job will have to be kept as secret as the building of the first radar chain in the late thirties.

"At the same time, I'm going to push up my transmitter power again. I hope to be able to beam the output much more narrowly, and so greatly increase the energy concentration. But this will involve all sorts of mechanical difficulties, and I'll need more assistance."

I promised to do my utmost to get further aid, and the Professor hopes that you will soon be able to visit his laboratory yourself. In the meantime I am attaching a photograph of the vision screen, which although not as clear as the original will, I hope, prove beyond doubt that our observations are not mistaken.

I am well aware that our grant to the Interplanetary Society has brought us dangerously near the total estimate for the year, but surely even the crossing of space is less important than the immediate investigation of this discovery which may have the most profound effects on the philosophy and the future of the whole human race.

I sat back and looked at Karn. There was much in the document I had not understood, but the main outlines were clear enough.

"Yes," I said, "this is it! Where's that photograph?"

He handed it over. The quality was poor, for it had been copied many times before reaching us. But the pattern was unmistakable and I recognized it at once.

"They were good scientists," I said admiringly. "That's Callastheon, all right. So we've found the truth at last, even if it has taken us three hundred years to do it."

"Is that surprising," asked Karn, "when you consider the mountain of stuff we've had to translate and the difficulty of copying it before it evaporates?"

I sat in silence for a while, thinking of the strange race whose relics we were examining. Only once—never again!—had I gone up the great vent our engineers had opened into the Shadow World. It had been a frightening and unforgettable experience. The multiple layers of my pressure suit had made movement very difficult, and despite their insulation I could sense the unbelievable cold that was all around me.

"What a pity it was," I mused, "that our emergence destroyed them so completely. They were a clever race, and we might have learned a lot from them."

"I don't think we can be blamed," said Karn. "We never really believed that anything could exist under those awful conditions of near-vacuum, and almost absolute zero. It couldn't be helped."

I did not agree. "I think it proves that they were the more intelligent race. After all, *they* discovered us first. Everyone laughed at my grandfather when he said that the radiation he'd detected from the Shadow World must be artificial."

Karn ran one of his tentacles over the manuscript.

“We’ve certainly discovered the cause of that radiation,” he said. “Notice the date—it’s just a year before your grandfather’s discovery. The Professor must have got his grant all right!” He laughed unpleasantly. “It must have given him a shock when he saw us coming up to the surface, right underneath him.”

I scarcely heard his words, for a most uncomfortable feeling had suddenly come over me. I thought of the thousands of miles of rock lying below the great city of Callastheon, growing hotter and denser all the way to the Earth’s unknown core. And so I turned to Karn.

“That isn’t very funny,” I said quietly. It may be our turn next.”